



Determining Medical Staffing Requirements for Humanitarian Assistance Missions

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Determining Medical Staffing Requirements for Humanitarian Assistance Missions

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ABSTRACT Objective: The primary mission of hospital ships is to provide acute medical and surgical services to U.S. forces during military operations. Hospital ships also provide a hospital asset in support of disaster relief and humanitarian assistance (HA) operations. HA missions afford medical care to populations with vastly different sets of medical conditions from combat casualty care, which affects staffing requirements. Methods: Information from a variety of sources was reviewed to better understand hospital ship HA missions. Factors such as time on-site and location shape the mission and underlying goals. Results: Patient encounter data from previous HA missions were used to determine expected patient conditions encountered in various HA operations. These data points were used to project the medical staffing required for future missions. Conclusions: Further data collection, along with goal setting, must be performed to accomplish successful future HA missions. Refining staffing requirements allows deployments to accomplish needed HA and effectively reach underserved areas.

INTRODUCTION

As peacekeeping, humanitarian, and disaster relief needs in the global community escalate, the U.S. military has committed more resources to assist underserved populations. U.S. military medical personnel will likely deliver humanitarian assistance (HA) at some point in their careers, as evidenced by one survey that showed HA was performed by 70% of deployed U.S. Army internal medicine physicians.¹ These operations also fulfill forward presence and crisis response strategies that are an integral part of U.S. Navy policy.^{2,3} Since 2005, both hospital and amphibious ships have been deployed on exclusively humanitarian missions as part of Combatant Commander Theater Security Cooperation Plans. These missions focus on providing medical care to underserved populations and conducting much-needed construction projects. The advantages of engaging in these humanitarian assistance

(HA) missions are many, including building indigenous capabilities and cooperative relationships, keeping U.S. forces forward deployed, providing training and readiness benefits, and promoting peace and stability. In addition, they help develop cooperative relationships and sensitivity to other cultures, which is necessary during stability, security, transition, and reconstruction operations.

Arranging these HA missions is complex for naval planners and logisticians who must account for a new and varied population that differs greatly from traditional Navy ship deployments. Operational readiness must be maintained; however, staffing and resources require flexibility to respond to varied geographical regions and medical conditions. Staffing is particularly multifarious; the missions rely on a diverse mix of U.S. military, foreign military, and nongovernmental organization (NGO) medical providers to treat patients both aboard ship and in the host nation (HN) ashore. By looking at the recent experiences of the hospital ship USNS Mercy (T-AH 19), a staffing plan will be suggested that will help ensure a successful medical HA mission.

The current staffing and equipment and supply levels are designed for the primary mission of combat casualty care. When an HA mission is scheduled, planners are left without clear guidelines for optimal ship staffing. This is further

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complicated by the cooperative nature of working with NGOs, since it is difficult to predict how many providers and what specialties will supplement the U.S. military medical staff. If the hospital ships are to be continually used for routine HA, staffing requirements specific to this type of mission need to be established. This is especially true in our current climate, where medical personnel are in high demand because of the stress of other military commitments.

To address this issue, a few months after *Mercy* returned from the 2005 tsunami relief mission, the Naval Health Research Center (NHRC) was tasked with determining the optimum mix of active duty and NGO personnel required to perform HA. Previous NHRC studies sought to determine the injuries and illnesses encountered during humanitarian missions.^{4,5} Unfortunately, patient encounter data are not collected for most missions, and information about the quantity and type of staff performing the work is not readily accessible. Understanding the medical needs of the population, another underreported and unmined data area, is imperative to determine medical staff requirements. To address this issue, NHRC's goal was to collect patient encounter data during *Mercy*'s deployment to the Philippines, Bangladesh, Indonesia, and East Timor for humanitarian and civic assistance starting in May 2006. The patient encounter data would help determine the (1) types of medical conditions seen, (2) level of medical and surgical intervention, (3) medical tasks performed, and (4) quantity of medical staff and specialties used afloat and ashore. From this information, the required medical skill sets to successfully accomplish an HA mission can be identified.

METHODS

NHRC used the logical framework process (LFP) suggested by Drifmeyer (2004) to analyze the collected data and determine the HA staffing and skill set requirements.^{6,7} Ideally, the LFP would be used before an HA mission to guide planning and determine clear goals. Although *Mercy*'s HA mission was conducted without going through the steps of the LFP, the nature of the process lends itself to historical application. It is important to note that the staffing for *Mercy*'s 2006 mission was based on the 2005 HA and disaster relief deployment that was rapidly mobilized in response to the 2004 tsunami that occurred in Southeast Asia. Figure 1 demonstrates a simplified example of this multilevel mission planning.

Briefly, the first step of the LFP is to formally state the mission's goals, objectives, activities, inputs, and outputs. The initial LFP component is designed to meet the flexible needs of HA missions and is scalable so that deployments of any size can be accurately forecasted. Questions posed in the initial planning stages may include: What are the goals of the mission, and therefore, what services will be offered to an HN—direct patient care and/or capacity building? What are the HN's needs? What assistance can the hospital ship offer that meets the needs of the HN and meets the resource/time con-

straints of the military? Follow-on information that will have an impact on planning include ship platform, length of time the ship will be deployed at the location, facilities available for personnel who stay ashore, number of locations at which personnel will be placed, and types of services offered.

Once the operational planning factors have been determined, research into what injuries and illnesses are expected in the planned HNs will further influence the capabilities and services offered during the HA mission. Within this framework, the mission's expectations and goals will be continually refined, making the selection of medical providers, capacity-building personnel, and support staff easier to define. For a training objective, the personnel may include physicians, nurses, corpsmen, and preventive medicine (PM) personnel. For a capacity-building construction project, a construction detachment may be requested. Direct patient care (surgical or primary acute care) will require a mix of physicians, nurses, and corpsmen. Medical equipment repair/installation projects will require biomedical equipment repair technicians. The logistics and force protection personnel requirements are greatly dependent on knowing as much as possible about the various sites where the services will be performed. The number of translators available may also limit the site operations planned. The available resources of the chosen ship platform (*Mercy*) and ashore HN facilities, combined with the selected tasks to be performed, will allow a refined estimation of the quantity and types of medical staff necessary to accomplish the HA mission.

The follow-on LFP steps focus on assessing the assistance provided and measuring the mission's success—defining the variables to be measured and their relationship to each other and ensuring that the intended outcomes are achieved. Although outcome measures are not directly related to staffing decisions, thoroughly following the LFP steps will likely lead to staff changes for future missions.

Once the mission was framed using the LFP, a schema was created as the basic outline for determining HA staffing and skill set requirements. Important factors included transit, ashore, shipboard, capacity building, and support personnel.

There are several parts to an HA mission, and the staffing requirements are unique to each segment. The basic staffing flow for hospital ship HA mission requirements include transit personnel, personnel for direct patient care ashore and afloat, capacity-building personnel, and support staff. These categories are not exclusive, as was the case on *Mercy*. For example, *Mercy* transit personnel participated in the delivery of HA once on site, and training personnel also participated in patient care activities.

With this framework in place, NHRC then looked at the data captured aboard *Mercy* during the summer 2006 mission. When analyzing the results, all data were categorized among the above staffing areas.

The data were taken from several spreadsheets provided to NHRC by *Mercy* personnel. The majority of the patient data were from a level-of-effort spreadsheet, which con-

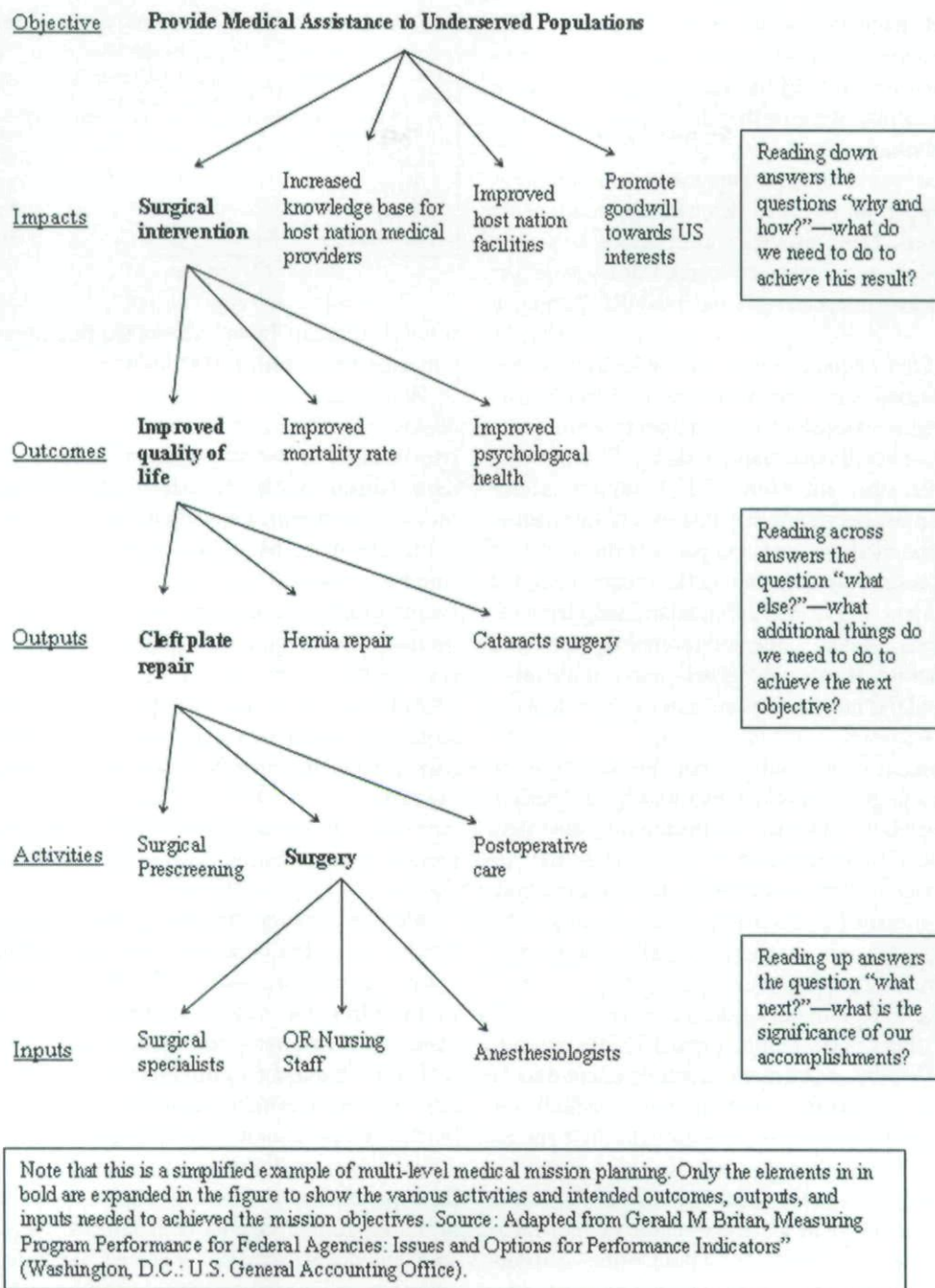


FIGURE 1. Logical Framework Process multi-level medical mission planning example.

tained the patient counts for each department/division by location. A log of surgical patients seen aboard Mercy from May through July 2006 was also given to NHRC. Lastly, Mercy personnel provided NHRC with a spreadsheet containing the location and diagnosis for patients seen at the mission outreach sites. The lack of both individual encounter data by day and data collection standardization limited the analysis performed by NHRC. Staff data were taken from a database maintained by the USNS Mercy administrative department.

RESULTS

The results of the data collected aboard USNS Mercy yielded two data sets: workload data and staffing data. The workload data set can be categorized by work location, either ashore or aboard ship. Ashore activities included direct patient care and capacity building. There were two types of patient care: (1) patients seen at a typical medical outreach and (2) patients seen at an HN medical facility. Capacity-building activities included training, biomedical equipment repair services, PM surveys, and minor facility construction or repair. Shipboard

activities were exclusively composed of surgical patients. The staffing data were categorized teams of personnel who performed the activities ashore or by the various functional areas on the ship. The personnel were further divided by active duty military or NGO civilians.

NHRC reviewed workload and personnel data and summarized by location in an effort to determine a relationship between the data sets. Daily briefings were also reviewed to better understand data anomalies. A detailed analysis of the personnel and workload data can be found in NHRC Technical Report 07-44.⁸

The limited patient encounter data available show respiratory system diseases were most common (20%) across the locations visited by Mercy in 2006. Patients with symptoms, signs, and ill-defined conditions made up 12% of those seen at the outreach sites, followed by 11% with musculoskeletal system and connective tissue diseases. Almost one-quarter (22%) of the medical outreach patients did not have an ICD-9 code. Reasons for missing ICD-9 codes included illegible recorded data and a lack of standardized terminology or abbreviations, which made interpretation confusing or impossible. These self-referral results marry with other military HA encounters; however, more standardized data are needed.⁹

Seventy-one percent of the surgical patients fell into one of four categories: congenital anomalies (20.9%), endocrine, nutritional, and metabolic diseases and immunity disorders (18.1%), digestive system diseases (16.1%), and nervous system and sense organ diseases (15.9%). This information, along with lessons learned and staffing ratios developed by Mercy staff after the tsunami response in 2005 were used to shape the staffing recommendations.

There is no "required" number of personnel to deliver the ashore mission of direct patient care. Typically, medical outreaches are performed by small medical teams composed of physicians, dentists, corpsmen, and pharmacy technicians offering basic medical services on a first-come, first-served basis. In most cases, the number of people waiting for care far outweighs the number of patients seen. In planning a medical outreach team, the goal is not to see every person in line, but to provide "some" medical care to the local population. A medical outreach team can be scaled to whatever size resources permit. The recorded number of personnel sent ashore by Mercy for medical outreach missions (on average 28 medical and 16 nonmedical) seems reasonable, but it can be adjusted on the basis of individual site assessments. Other factors to consider are gender ratios and physician extenders, such as nurse practitioners and physician assistants, to address HN customs and expectations. NGO personnel can be used to deliver the direct patient care, although specialties like dentistry, optometry, and pharmacy did not have many NGO volunteers. However, these are highly sought services that can make a lasting difference to the underserved population. Military personnel will most likely continue to deliver care for these specialties. Military personnel will also be required for command and control and

TABLE I. Required Functional Areas to Be Staffed for HA Missions

Required Functional Areas	
Direct Patient Care	Pathology
Surgical	Dentistry
Psychology	Optometry
Laboratory	Pharmacy
Radiology	Preventive Medicine

force protection. Table I shows the functional areas that need to be staffed during an HA mission.

Historically, general surgeons will volunteer through NGOs, therefore the number of military general surgeons requested for HA missions can be reduced. Specialty surgeon requirements may not be met by NGO personnel. The number of surgeons required is dependent on the number of operating rooms open, the types of surgeries expected, and available supplies, which should be determined ahead of time when framing the mission using the LFP. Additional surgeons are needed to screen potential patients during the first few days at each site.

Another factor to consider when determining staffing requirements is the operating hours of each functional area. The patient receiving area will have limited operating hours during HA missions, therefore staffing does not require 24-hour coverage. On the other hand, ICU, Isolation, and ward beds require 24-hour staffing. Coverage is broken into two 12-hour shifts.

Mercy staff suggested embarking a psychology debriefing team to help staff cope with any patient deaths and the difficulty of leaving a location where many people will continue to suffer from the lack of available medical care. This medical team was added to a later Mercy mission with success.

During the last two missions, Mercy has traveled to locations that have a high tuberculosis incidence. This can be a burden if the laboratory and radiology departments are not adequately staffed. The lab manning suggestions are based on the experience of a Mercy lab officer. A pathologist is included in the suggested quantity of lab officers. Planning for the lab staff should include the expected needs for disease testing and routine surgical screenings. Additionally, the Radiology Department took chest X-rays of all shipboard patients to detect tuberculosis and performed other imaging techniques not available at HN medical treatment facilities.

Table II displays the specialty mix of physicians, nurses, and corpsmen. This staffing example includes common hospital ship mission elements—ashore, capacity-building, and shipboard personnel. The following assumptions about the shipboard capabilities were made to determine the required staff: 3 ORs, 15 casualty receiving (CASREC) beds, 4 ICU beds, and 60 ward beds. For future missions, the specialty mix of surgeons and medical providers should be tailored to the mission goals and objectives. Since the hospital ships are in port for a limited time, prior screening is needed to identify

TABLE II. Staffing Recommendations, by Medical Specialty

	Designator/NEC	Total Quantity	Minimum Military		Designator/NEC	Total Quantity	Minimum Military
Physicians	2100			Medical Technology		1	1
Family Practice		3	1	Microbiology		1	
Pediatrician		2		Physical Therapy		1	1
Internal Medicine		6	2	Clinical Dietetics		1	
OB/GYN		1		Optometry		5	
General Surgeon		6	1	Psychologist		1	
Ophthalmologist		1		Supply		1	1
Orthopedic Surgeon		1	1	Medical Enlisted	HM		
Anesthesiologist		2	1	General Duty Corpsman	0000	68	
Radiologist		1	1	Surface IDC	8425	3	
Pathologist		1	1	Preventive Medicine Tech	8432	6	
Dentists	2200	2	1	Ocular Tech	8445	1	
Nurses	2900			Advanced X-Ray Tech	8452	3	
Critical Care		8	3	Optician	8463	2	
Perioperative		6	3	Physical Therapy Tech	8466	3	
Medical Surgical		20	4	BMET	8478	10	
ER-Trauma		2	1	Pharmacy Tech	8482	12	
Nurse Anesthetist		4	2	Surgical Tech	8483	12	
General Nurse		2	1	Orthopedic Cast Tech	8489	1	
Medical Services	2300			Histopathology Tech	8503	2	
Pharmacist		3	1	Cyto Tech	8505	1	
POMI		1	1	Med Lab Tech	8506	8	
Patient Admin		2	1	Respiratory Tech	8541	4	
Entomologist		1		Dental Tech	8701	4	
Environmental Health		2		Dental Lab Tech	8752	1	
				Psych Tech	8485	2	

NEC, Navy enlisted classification.

surgical cases that will likely have a highly successful outcome with limited follow-up requirements. Surgical interventions that meet these constraints are often performed by specialists such as ENTs and Plastics. The available NGO medical providers will also affect mission capabilities. Table II shows the minimum number of military personnel for nursing and physician specialties needed on the basis of department head and division officer positions. NGO staffing is difficult to anticipate and will not be consistent mission to mission. This places an even greater importance on determining the minimum military staffing commitment.

COMMENTS

To plan HA operations appropriately, the mission requirements must be known. Drifmeyer's LFP (2004) should be used to formally plan the mission and determine the important goals, objectives, activities, inputs, and results. This information includes such variables as the ship platform, expected patient conditions, and time at the site, which constrains the possible medical interventions, determines the appropriate medical specialties, and has an impact on the necessary support staff. It is important to acknowledge that effective HA helps build the HN health care infrastructure, and, over time, can allow that nation some level of self-sufficiency.

To plan a relevant HA mission, research into the expected HNs must be conducted. This crucial information will give

planners insight as to what specialties will be needed, what types of training will be most valuable, and what surgeries will have a lasting impact on the HN populations. Partnerships with the HN and NGOs operating within the HN's borders will improve the quality of care and relations, especially in the event that disaster relief is needed in the future. A staff planning model by Cooperman and Houde is an excellent resource for country information and mission planning (K. Cooperman and L. Houde, unpublished master's thesis). Capacity-building exercises, including training, repair, construction, and site assessments, will provide lasting skills and equipment to the HN medical providers. This, in turn, will allow the HN populations to receive higher quality medical care in the future.

NGO personnel can fill many of the nursing and physician requirements as long as professionals in the appropriate specialties volunteer to meet the mission goals. The hospital corpsman requirements will not be replaced by NGO personnel. Military medical personnel will remain in each of the functional areas to provide leadership, continuity, and other duties that cannot be supported by NGO personnel, such as administrative tasks. At a minimum, military personnel are needed as department heads for the medical, nursing, and surgical departments. Military personnel should also fill division officer positions within the departments such as ICU, patient receiving, ward, sick call, radiology, and dental.

The partnership of the hospital ships with NGOs allows both parties to achieve their missions. The hospital ship provides goodwill and a U.S. presence, and the use of NGO personnel eases the burden on the military medical personnel demands. For the NGOs, it is an opportunity to provide the medical benefits for which they are known to the communities they currently serve and to reach additional populations.

The LFP requires that mission leaders provide assistance, assessment, and measurement of the mission's success once the HA deployment is complete. These valuable steps will allow further refinement of the staffing estimations that have been suggested. Continuing HA missions by USS Peleliu (LHA 5), Kearsarge (LHD 3), Boxer (LHD 4), USNS Comfort (T-AH 20), and Mercy provide an opportunity to plan repeat visits to those HNs most in need and varying platforms to gather patient encounter, staffing, and supply data. An electronic patient data system that can be used ashore by hospital ship personnel which aggregates data for easy daily situation reporting is ideal.

Further data collection will allow the Navy to improve staffing and supply requirements, resulting in more effective patient care and improved services. The resulting data will also help determine whether HA is having a positive effect on HNs when repeat visits are performed. With a continued commitment to planning and improvement, future missions will deliver quality healthcare to underserved populations.

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